

# Exchange rate pass through to import price in Iran: Quantile regression approach

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## ABSTRACT

The main objective of this study is to investigate the exchange rate pass through to import price using Iranian seasonal time series over the period 1991:2-2015:1. For this purpose, the empirical model, has been Estimated using Quintile Regression as a useful tool. The results indicate that degree of exchange rate pass through is incomplete in various deciles, so that the exchange rate pass through to import price in 4 first deciles is positive and significant and in upper deciles is negative and non-significant. Also, the results show that degree of exchange rate pass through to import price in first to 4th decile is varied between 0/21 to 0/08 percent, so that higher decile led to lower degree of exchange rate pass through.

**Keywords:** Exchange rate pass through, import price, Iran's economy, Quantile Regression

## Introduction

The exchange rate is crucial as one of the key economic variables in the import price index. Changes in the exchange rate affect the level of domestic prices by altering the import prices. Thus, the effect of the exchange rate on the import price index, which is known in the economic literature as the Exchange Rate Pass Through, represents the percentage of changes in the import price index relative to one percent of exchange rate variation.

Exchange rate is one of the most important variables affecting the economies of the developing countries like Iran. Most developing countries are supplied with the technology inherent in the imports in order to pass from the traditional production stage to the industrial production stage and also during the development stages of the economy. Correspondingly, Iran's economic structure, as one of the developing countries, has a

great deal of import dependency; so, identifying the factors affecting imports is of great importance in the Iranian economy as well. As it is observed, along with the country's currency devaluation, import prices and consequently the cost of imported inputs is increased and domestic production and prices are affected. The price of imported goods is important in two respects: on one hand, if imported goods are considered as raw materials and as capital goods, an increase in the import price index increases the domestic prices. On the other hand, along with the rising of the prices of imported goods (consumer goods) the welfare level of domestic consumers' decreases. Thus, controlling the price of imported goods is possible by identifying the factors that can be influential<sup>[1]</sup>.

Exchange rate changes lead to unstable economic policies. Also, Exchange Rate Pass Through demonstrates the degree of international price's reaction to the changes in the exchange rate. The low or high Exchange Rate Pass Through is an explanation for the low or high sensitivity of trade to the changes in the value of the national currency. Therefore, the study of the Exchange Rate Pass Through can help the policy makers for appropriate foreign exchange policies. This is because imports are rival to domestic products and any exchange rate changes affects the import prices depending on the degree of crossing rate.

This condition will improve the balance of payments, regulate and adjust the trade balance and will increase production and

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employment domestically. So, the Exchange Rate Pass Through can explain the short-term dynamism of the trade balance followed by an increase in the exchange rate. The previous researches have illustrated that the impact of crossing exchange rate on import prices is incomplete. The incomplete Exchange Rate Pass Through into import prices of goods can be due to a violation of the Law of One Price (LOOP) of exchangeable goods. The violation of Law of One Price takes place either due to trade costs or pricing based on market conditions. In other words, if the final cost of a trade is fixed the Law of One Price is adhered and the exchange rate changes are fully transmitted. An observation of the statistics of the exchange rate and import costs in the Iranian economy shows that these two variables have been closely related to each other during the past several years; yet in some years there is no clear connection<sup>[2]</sup>.

According to the new studies, the degree of Exchange Rate Pass Through on the import prices is non-linear and it can be different depending on diverse economic situations which are dominating countries. Among these factors, inflation conditions and monetary regimes can be set as examples. The significance of this research for policy makers is more evident when an experimental relationship between the degree of Exchange Rate Pass Through on the import prices is defined per different deciles using regression quantile. If the degree of Exchange Rate Pass Through is different in different deciles of exchange rate, the linear relationship between the exchange rate and the import costs loses its efficiency and economic policy will vary at different exchange rates; therefore, policy makers need to be aware of this fact. Consequently, the main purpose of this paper is to examine the scale of Exchange Rate Pass Through on import prices in Iran concerning different deciles. Taking this relationship into account and considering the tendency of data of import prices and exchange rates discussed in the part 1-4 of this paper, the main issue in Iran is the close connection between the two variables; and the main question can be the way these two issues are interrelated in different levels. Using quantile regression can be helpful showing the relationship between exchange rate and import prices in different deciles. In this regard, the continuation of this paper is organized as following:

In the second part an overview for literature on the topic of research, which is expressed in the first part of theoretical foundations, has been presented. And in the second part the international and domestic studies are reviewed. The third part is allocated for introducing the approach of study and estimation of pattern. In the fourth part, the research findings are expressed. Finally, in the last part, with use of the results of the study recommendations for policymakers are expressed.

## Literature Review

### Theoretical foundations

Exchange rate, as one of the most important and effective macroeconomic variables, has an important impact on other

macroeconomic variables such as production, imports, exports, balance of payments, etc.<sup>[3]</sup>. From the traditional economists' point of view, exchange rate altering has a direct impact on exports and reverse impact on imports. Associated changes in the trade balance and exchange rates, in a way that the devaluation of the currency (Increase in the exchange rate) has an expansionary effect on the economy, improves the trade balance.

However, poststructuralists believe in the contracting impact of the rise of the exchange rate (devaluation) on economy<sup>[4]</sup>. According to this view, in the economies, in which Marshall Lerner's condition is violated, decreasing value of money leads to increase in import and decrease in export and thus it leads to decrease in production<sup>[5]</sup>. Primary studies about ERPT in the field of exchange rate passage on import index has been started since 1970 by Goldberg and Knetter. Nonetheless, subsequently the scope of these studies has spread to impact of exchange of rate on the level of price of domestic production and export according to domestic currency. In fact, the basic association between the exchange rate and the price of internationally traded commodities is commonly called the scale of exchange rate pass through. This term has been developed for the first time by Magee (1973)<sup>[6]</sup>. However, the first study carried out accurately with use of math patterns has been observed by Dornbush (1987)<sup>[7]</sup>. In other word, Dornbush was the founder of other studies about the impact of exchange rate pass through on prices. In his study, he has observed the relationship between exchange rate and domestic prices based on concentration of market, the scale of imports, import substitution and domestic productions.

Goldberg and Knetter (1997) have called the percentage of change of imports' as a consequence of one percent alteration in exchange rate among importer and exporter countries as the degree of exchange rate pass through<sup>[8]</sup>. In this regard, the term degree of exchange rate pass through on import price indicates the extension of price of import over exchange rate. In this way, if for one percent change in exchange rate, the price of import changes one percent the degree of exchange rate pass through on import price is complete and if imports' price reaction over exchange rate changes is less than one, the degree of exchange rate pass through is incomplete.

Exchange rate pass through is the effect of changing the exchange rate on one of the followings:

1- export and import prices; 2- consumer prices

In other words, exchange rate pass through is the percentage of change of imports' price according to domestic currency that has been created from one percent change in exchange rate:

$$\alpha_t = \frac{\% \Delta p_t / p_t}{\% \Delta e_p^* / e_p^*}$$

In this regard, the estimated exchange rate pass through is ( $\alpha_t$ ),  $p_t$  shows the domestic price level of the country in time (t) and  $\Delta$  is the indicator of the changes; and (e) represents the nominal exchange rate for the country. Also, (p) is the indicator of international prices<sup>[9]</sup>. Theoretically, the full passage of the

exchange rate occurs when  $\alpha=1$ ; and the incomplete exchange rate passage occurs when  $0 < \alpha < 1$ .

Exchange Rate Pass Through into imported goods takes place in the form of percentage of the increase in the price of imported goods in terms of domestic currency as a result of a one-percent increase in exchange rates. In addition, the impact of exchange rate pass through to exported goods' is explainable price in the form of the percentage of the reduction in the price of exported goods according to foreign currencies as a result of one percent increase in the exchange rate. Thus, exchange rate pass through surveys the relationship between value changes of a country's currency and the trades of that country. The low or high level of exchange rate pass through is an explanation for the low or high sensitivity of size of trade to changes of the value of the national currency. It is noteworthy that, limiting the degree of exchange rate pass through between zero and one is not always correct. The degree of the exchange rate pass through can be more than one in the case the demand curve for the goods is convex; however, these curves are practically rare <sup>[10]</sup>.

The exchange rate pass through is considered fully when the import price according to exchange rate and the export price according to domestic currency will remain constant. In this status, the devaluation of the domestic currency of a country leads to deterioration of the trade relations of that country. Complete exchange rate pass through is related to Keynesian's view (short-term period).

On the other hand, the growth of trade size, as the domestic currency loses its value, causes the improvement of trading relations. If the primary commerce balance is subject to deficit, the improvement of the exchange in import price index is more as the trade balance is valued according to exchange rate. In this state, the degree of exchange rate pass through is zero <sup>[11]</sup>. Also, when the exchange rate pass through is incomplete, the amount of reduction in exchange in import price index is lower than the amount of decrease in the value of money. Therefore, short-term changes in trade balance as a result of the decline of currency value will take place in a lower scale. In this condition, the impact of the decline of currency value on trade balance will never be as much as the condition in which exchange rate pass through is complete <sup>[12]</sup>. According to the recent studies, the scale of the exchange rate pass through on the imports' price is nonlinear and it is different depending on the economic conditions dominating a country.

Among these factors inflation conditions, monetary regimes and different similar factors can be mentioned. In this regard, the studies of Taylor (2000), Caselli (2016), Asgharpoor and Mahdilou (2016), Asgharpoor and et al (2015) can be mentioned <sup>[2, 13-15]</sup>.

Furthermore, the degree of openness of the economy, as one of the effective variables of exchange rate pass through can be mentioned. The degree of openness of the economy has a direct and indirect effect on the degree of exchange rate pass through. Concerning the direct impact of the degree of openness on the degree of exchange rate pass through, it is expected that along with the growth of trade extent the severe fluctuations of

exchange rate are transferred to the imported and consumed goods, and consequently the degree of exchange rate value will increase. Therefore, concerning the mentioned direct impact, a straight connection between degree of openness of the economy and the degree of exchange rate pass through can be expected. However, concerning the indirect impact, which has been proposed by Akofio Sowah (2009), the increase in the degree of openness, can help to reduce inflation level by increasing the imported goods as well as capital goods by domestic producers <sup>[16]</sup>. So, depending on the economic conditions and exchange rate changes, the degree of exchange rate pass through on imports' prices can be affected and in this manner exchange rate pass through can change too.

## A Review of Carried Out Studies

- **International studies:**

Menon (1995) has examined 43 empirical studies on the transfer of exchange rate changes <sup>[17]</sup>. Most of these studies have concluded that the transfer of exchange rates changes is not complete and varies from country to country. The factors affecting this difference are the degree of openness of economy and the economic size of countries. According to Menon's studies, different results for a country depend on the methodology, the models' features and the choice of variables and these different results do not depend on the differences in the time period. Most of these studies are carried out using the Ordinary Least Squares method, and usually features of the time series as non-durability of series have been ignored.

Lane (2001) studied the Columbian exchange rate currency over the period (1978-1990) <sup>[18]</sup>. In this study, with using of the Vector Autoregressive Regression model, he examines the exchange rate pass through to imported goods price, producer price index and consumer price index. He concludes that the exchange rate pass through is incomplete in this country.

Campa and Goldberg (2002), using the panel information of OECD countries and during (1975-2001), monitored the degree of exchange rate pass through on imports' price <sup>[19]</sup>. They tried to determine the short-term and long-term effects of exchange rates pass through on imported goods. They have concluded that in the long-term period, the exchange rate pass through on imported goods is more obvious than short-term period.

Using the seasonal data during (1986-2004), considering microeconomic concerns and long-term and short-term capacity, Ito and et al (2005) have estimated transfer of changes of exchange rate for East Asian countries <sup>[20]</sup>. Using Vector Auto-regression, Cholesky Decomposition, reaction functions and the analysis of the variance they evaluated the degree of the exchange rate pass through on domestic prices for these countries. They concluded that the degree of exchange rate pass through to import prices was high in the countries which suffered severe financial crisis.

Ghosh and Rajan (2009), using the Johanson-Jussilius Cointegration Model, evaluated the effects of exchange rate instability on the index of prices of imported goods in Korea

and Thailand over the period (1980-2006) <sup>[21]</sup>. The results of the estimation model illustrated that the exchange rate instability has a positive and significant effect on the price index of imported goods and along with the intensity growth of the exchange rate fluctuation, the price of imported goods increase. Dramani and Tandoh (2011), using the Auto-regressive Co-integration method with distributed lags, studied the degree of transfer of the exchange rate effects in the frame of the price index of imported goods in Ghana during (1990-2010) <sup>[22]</sup>. The results of the estimation model indicated that in the short-term period the degree of effect of transfer of the exchange rate is low. Yet, in long time period the price variability of consumer goods is higher than exchange rates compared to short-term period.

Choudhri and Hakura (2012) examined the Exchange Rate Pass Through on the Export and Import prices for Organisation for Economic Co-operation and Development (OECD) countries during the period of 1979-2010 <sup>[23]</sup>. They find that for many countries, the exchange rate pass-through to import prices is incomplete and greater than the pass-through to export prices. Their paper suggests an alternative explanation by considering both producer and local currency pricing. The paper by using a dynamic general equilibrium model shows that a mix of producer and local currency pricing can explain the pass-through evidence with presence of constant markup.

Sweidan (2013) evaluates the degree of exchange rate pass through on the import prices in Jordan in a general level and analyzing the data <sup>[24]</sup>. In this study, he has utilized the annual data during the years (1976-2011), the boundary test method, co-integration, vector error correction in order to estimate the degree of exchange rate pass through. The mentioned paper concluded that the fluctuations of the nominal exchange rate and the price of oil are the basic principles of import prices. The exchange rate pass through in Jordan is incomplete and equals 0.13. Furthermore, in the short-term period, the price of oil in Jordan has larger effect on import price in comparison with nominal exchange rate fluctuations.

Fatai and Akinbobola (2015), using the annual time series data of Nigeria during 1986-2012 in their study, examined the exchange rate pass through in imports' price, inflation and monetary policies <sup>[25]</sup>. In their study, the nominal exchange rate index is a significant word and they have used variables like imports' price, inflation, money supply, interest rate and oil price index attained from central bank of Nigeria and published by the World Bank.

The calculation of function with the use of VAR illustrated an immediate reaction in an average level to the analysis of variance. Also, the exchange rate pass through on import price is meaningful and stable and about inflation it is brief and in short-term. The results of the research indicated an incomplete exchange rate pass through.

Cheikh and Rault (2016), in a paper examined the exchange rate pass through on imports' price for 12 countries in Euro zone <sup>[26]</sup>. Initially, based on trimester period data during 1990-2012 and in contrast with previous studies, by membership in monetary unions they found a significant non-homogeneity in

the degree of exchange rate pass through with utilization of Generalized Least Squares Method. With the use of a long-time stage for the period after comparing the studies within Euro zone, it is not surprising that the monetary union process requires some convergence towards macroeconomic conditions that are more stable than those of Euro zone members. Furthermore, assessing the stability of the exchange rate pass through by Price Elasticity, a very weak decline in the beginning stages of the Euro in 1990 was found. The results indicated that, there is a descending trend in the estimation of exchange rate pass through since the beginning of 1990.

Kasli and Roitman (2016) examined the exchange rate pass through on the price of imports during 1991-2011 by the course of nonlinearity. In the paper, it is maintained that achieving the non-linear and asymmetry in transferring the exchange rate fluctuations on import prices, using local planning techniques depends on the conditions of the instant response within a panel about 28 emerging markets. In this period, considerable evidences indicated that the price decline was more than 10 to 20 percent. Also, the study has targeted to assess the temporary roles against permanent shocks and adopting an inflationary regime for exchange rate transfers on price.

Bandt and Razafindrabe (2017) in their paper "Pass-Through of competitors' exchange rates to US import and producers' prices" showed that the prices of imported goods respond to the exchange rates (ER) of the producer's foreign competitors in theory and BLS micro data. In contrast to this, standard models don't have any impress for competitors' ERs. A multi-country version of Atkeson and Burstein's (2008) industry aggregation model can explain a significant proportion of pass-through of competitors' exchange rates to import prices, and also it can predicts pass-through of foreign competitors' prices and pass-through of competitors' ERs to US producer prices. The results suggest that pass-through will be greater for ER movements shared by a greater fraction of foreign competitor countries.

- **Domestic studies:**

Several studies have been conducted on the exchange rate pass through on the price index including the import price index, the export price index, and the domestic price index. The following paragraphs will present the main researches carried out on the degree of exchange rate pass through on imports' price.

Shajari et al. (2006), with the use of time series of Iran's economy during (1959-2002), concluded that monetary policies and degree of openness of the economy had positive and significant effects on the exchange rate pass through to the imports' price index.

Khoshbakh and Akhbari (2007), using the seasonal data and auto-regression vector of the structure and the momentum reaction of functions and Cholesky decomposition variance indicated that changes in exchange rate on import price index is more than the consumer price index <sup>[27]</sup>. In other words, the degree of exchange rate pass through on imports' price is higher than the domestic price.

Kazerouni and et al (2012), during the years 1975-2009, utilizing Time Varying Parameters (TVP) have concluded that the instable exchange rate variables, the gap of gross domestic production, the final cost of production for the commerce partners have a positive and significant effect on the degree of exchange rate pass through <sup>[28]</sup>.

Asgharpour and Mahdilou (2014), have evaluated the inflationary environments and the effect of the degree of the exchange rate pass through on imports' price in Iran during 1976-2010. Using Markov-Switching model, initially high and low inflationary environments are extracted. Then using Johansson-Jussilius co-integration test the impact of inflationary environments, along with the impact of the variables of final cost for business partners, the degree of openness of the economy and the effective nominal exchange rate on the index of prices of imported goods, have been investigated. The empirical findings of the research show that in Iran's economy, the degree of exchange rate pass through is incomplete and the inflationary environments have an asymmetric effect on the degree of exchange rate pass through to import price. The results show that the variable of the final cost for the trading partners have a positive and meaningful, and the variable of degree of openness of the economy has a negative and significant effect on the price index of imported goods.

Asgharpour and et al (2015), have assessed the impact of the inflationary environment on transfer of effect of exchange rate on imports' price in Iran with the use of time series method of co-integration (Johanson and Jussilius) during the years 1971-2012. Results of study indicate the incomplete relationship with the transfer of impact of exchange rate on import price index. Also, the study shows that in high and mediocre inflationary level, the amount of transfer of exchange rate on import price increases but this amount in high inflationary levels is less than mediocre inflationary levels.

Kazerouni et al. (2016), have observed the exchange rate pass through to price of Iran's automobile market with use of time series during 1982-2011 <sup>[29]</sup>. Results indicate meaningful relationship between market share and the degree of transfer of exchange rate on domestic prices. It means that with the growth of imports' share, the degree of exchange rate to domestic prices is decreased. Incompleteness of exchange rate is due to the fact that the domestic prices in Iran do not just follow the exchange rate. Other reasons as well, like the share of imports of goods is significant in the fluctuation of these prices. This causes that all exchange rate changes are not transferred to domestic and imported prices.

As it can be observed, different several studies about degree of exchange rate pass through on imports' price have been done in Iran. Compared with the other studies, the distinct part of this research is that for assessment of degree of exchange rate pass through on imports' price Quantile regression is used. The present research can be significant for policy making in Iran considering the fluctuations of exchange rate in this country. In previous studies, other methods were utilized.

## Methodology of Research

### Introduction to the Model

In the present study, the following pattern is considered to study the degree of the exchange rate pass through on the imports' price. The following pattern is used to examine the relationship between the exchange rate index and the imports' price.

$$\text{LNPM} = \alpha_0 + \text{LNEX} + \text{LNPPi} + \text{OP} + \text{LNGDP} + \text{U}_i$$

PM, is the import price index based on the year 2004. The data of this variable is from the database of Iran Central Bank.

EX, is the nominal exchange rate of free market and the information of this variable is based on the data from the Central Bank of Iran.

OP, indicates the degree of openness of the economy, and it is attained from total exports and imports on Domestic Gross Product. The information of this variable is also gained from the database of Central Bank of Iran.

PPI, is the indicator of the US producer price index, and it represents the final cost of the foreign production for the base year of 2004. The information on these variables is achieved from the site of Organization for Economic Co-operation and Development (OECD).

GDP is also the gross domestic production of Iran at the fixed price of the year 2004.

It should be noted that statistics and information have been collected through documentary and library method during the years 1991:1-2014:4.

### The Method of Estimation Model

In this study, to examine the degree of the exchange rate pass through on imports' price in Iran Quantile Regression approach has been used. Also, the calculation of parameters is based on Quantile regression. The Quantile Regression is based on a symmetric and asymmetric Loss Function. Similar to estimation of the parameters, the least second power is calculated within the regression. This model was introduced in 1978 by Koenker and Bassett and it gradually became a comprehensive method for statistical analysis of linear and nonlinear response-variable models in various fields <sup>[30]</sup>. With an accurate and comprehensive look in the evaluation of the response-variable, the main purpose to use quantile regression is to provide a model which can enable the interaction of independent variables not only in the data center, but also in all parts of the distribution, especially in the opening and the end of sequences without facing with usual regression's limitation of assumptions, or the variance of the heteroscedastic and the effective presence of the outlier data in estimation of coefficients. Unlike the typical regression, in the quantile regression minimizing the sum of Least Absolut Value is utilized to estimate template parameter and this approach is named as Least Absolute Deviation <sup>[31]</sup>.

The general definition of Quantile regression is such that, if we assume a linear regression model as follow:

$$Y_i = \beta_{\theta}x_i + \varepsilon_{\theta i}$$

And if we have this equation:  $Q_{\theta}(\varepsilon_{\theta i}|X_i) = 0$ . then conditional quantile of  $\theta$ , the distribution of Y under the condition of stochastic variables X is as following:

$$Q_{\theta}(Y|X_i) = \beta_{\theta}x_i, \quad i = 1, 2, \dots, n$$

In which,  $X_i = (1, X_{i1}, \dots, X_{ik}), \beta_{\theta} = (\beta_0, \beta_1, \dots, \beta_k)$  in vector order, they are of definite amounts and indefinite parameters, and  $\varepsilon_{\theta i}$  is an accidental invisible variable. The above equation is called linear quantile model of  $\theta$ . As mentioned before, least absolute deviation is used in Quantile regression by which the purpose is an estimation of regressional parameter of  $\theta$  belonging to quantile. In this regard, the subsequent loss function (absolute value of the remnants or weighted deviation) minimizes  $\beta_{\theta}$  over.

The equivalent of Foucault is the linear regression model of the mountains in the long run, called the regression. It is the same as the purpose of estimation as the regression parameter of the magnitude of the deviations used so much that it remains for the zone (the decay of the slabs or the deviations of the moons), the absolute magnitude of the remainder of this function, the negative effect that is sought after that.

$$Q_{\theta}(\beta_{\theta}) = \sum W(\theta)|Y_i - X_i\beta_{\theta}|$$

$$W(\theta) = \begin{cases} \theta & y_i \leq x_i\beta_{\theta} \\ 1 - \theta & y_i > x_i\beta_{\theta} \end{cases}$$

## Experimental Findings

### Introduction

In this section, firstly, the tendency of the main variables of the research (exchange rate and import price) is briefly reviewed and, at the end, the scatter-chart is drawn up and analyzed between the two main variables of the research. The observation of statistics of the exchange rate and import prices in the Iranian economy shows that these two variables during the past two decades, have been closely related. Yet, in some years there is no clear relationship between them. Changes in the exchange rate and import prices show that in the Iranian economy before the revolution, the import price had always an ascending trend. Because the main source of income, which was oil sales, had a gradually ascending trend. With the increase in international oil prices exchange rate increased as well and consequently the exchange revenues increased dramatically. This led to the elimination of many trade barriers. Yet, with the outbreak of the war, exporting oil faced with problems and affected the exchange revenues, which ultimately reduced the country's exchange revenues. Following the end of the war and the necessity for economic reconstruction of the country, as well as to reduce the various shortcomings in capital goods,

intermediate and consumption goods, with regard to trade liberalization the country's customs import price increased. But in the years 1992 and 1995, due to restrictive policies, import prices fell by 41%. Imports rate increased from in the years 1995 and 1996 reaching to 219699 billion Rials. Because during these years, along with the growth in exchange revenues attained from exports of oil, restrictive policies of import prices continued in a less intensity. The price of the exchange rate increased in the years 1995 and 1996 and it rose to 4446 Rials. In 1997, along with exchange revenues decline due to a sharp decrease in world oil prices, the value of imports decreased by 6% to 205673 billion Rials. This process continued until 1999. But since 2000, due to the rise in world oil prices, along with the liberalization of the commercial space in the direction of deregulation and encouragement and facilitating foreign trade, imports had ascending trend until 2011 reaching 449702 billion Rials. The price of the exchange rate has increased from 2000 to 2011 and reached 13568 Rials. But from 2012 to 2014, the imports decreased and reached 265210 billion Rials in 2014. The price of the exchange rate increased from 2012 to 2014 and reached 32801 Rials. Therefore, the amount of exchange revenues in the period of falling oil prices has declined due to the high dependency of exchange revenues on oil exports and oil price. Consequently, the situation led to an increase in exchange rates and import prices.

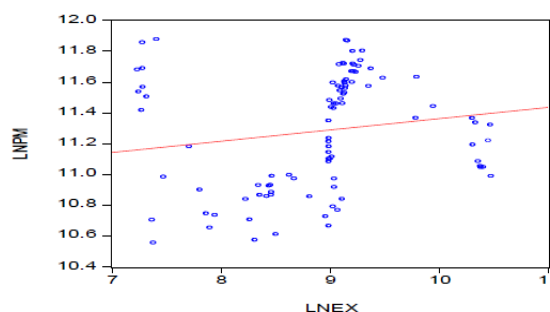


Figure 1: scatterplot of the logarithm of the exchange rate index and the logarithm of the import price index

The observation of the scatterplot between the logarithm of the exchange rate and the logarithm of the import price index reveals that there is no exact relationship between the two variables at different levels of the exchange rate. In this regard, in the lower deciles of the exchange rate, there is reverse relationship and in the middle deciles there is direct relationship and in the high deciles there is reverse relationship. However, this diagram does not necessarily show the exact relationship between the two variables, because the effects of other factors (control variables) can't be distinguished in this diagram. In other words, scatterplot correlation includes the effects of other variables as well. So, in order to extract the exact relationship between two variables compound regression need to be used. Nonetheless, a nonlinear relationship between the two variables is visible in the scatterplot and Quantile regression can correctly extract these correlations.

## The Interpretation of the Results of the Experimental Study

Among the various studies conducted in Iran, the extent and the

manner of the effect of the exchange rate pass through on import prices is shown in Table (1).

**Table 1: Comparison of previous study coefficients**

**The Range of the Changes of Exchange Rate Pass Through in the present study**

Studies	Shajari and et al (2006)	Mehrabi bashar abadi and et al (2011)	Samimi and et al (2014)	Behrad amin and zamanian (2014)	Asgharpur and mahdilo (2014)	Isazade roshan (2015)	Asgharpur and et al (2015)	Exchange rate through	Exchange rate through this study
Variable									
EX	0.416	0.14	-0.221	0.283	-0.30	-0.01	0.64	(-0.30 – 0.64)	(-0.40 – 0.210)

Source: Previous studies

As it can be seen, in past studies the degree of exchange rate pass through in Iran is incomplete and depends on the conditions governing on different the countries as well as the impact of different variables. These effects are positive in some studies and in some studies, they are negative. Different results in the past studies and at the present research can be due to the utilized techniques, spatial and temporal spheres, as well as the economic conditions prevailing on Iran's economy.

## The Estimation and Interpretation of Model Results

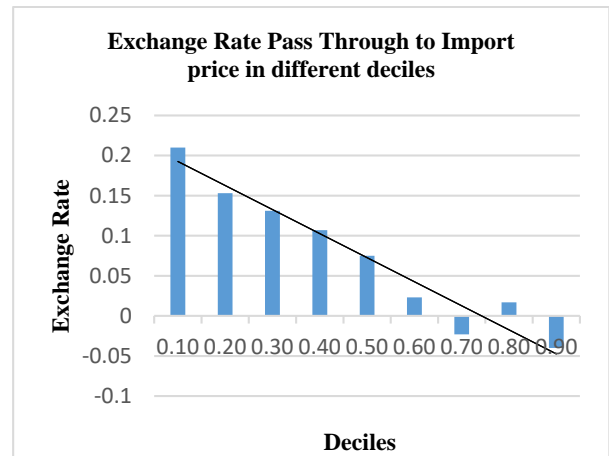
### Results

The main advantage of this technique is its no need for unit root test and it is without any linear constraints<sup>[31]</sup>.

**Table 2: Quantum Regression Results**

Dependent variable: Import price									
Quantile Regression <sup>1</sup>									
0.9	0.8	0.7	0.6	0.5	0.4	0.3	0.2	0.1	
-5.698*	-8.487*	-9.625*	-9.975*	-11.142*	-11.811*	-12.635*	-11.941*	-10.982*	Intercept
0.040	0.017	-0.023	0.023	0.075	0.107***	0.131**	0.153*	0.210*	LnEX
2.633*	3.323*	3.126*	3.148*	3.401*	3.610*	3.680*	3.668*	3.387*	OP
1.214*	1.381*	1.519*	1.644*	1.715*	1.810*	1.910*	1.798*	1.917*	LnGDP

Source: Research findings \* Significantly at 1% level  
 \*\* Significantly at the level \*\*\* Significantly at a level of 10%  
 Source 3 Findings of the research \* significance at the level of 1% \*\* significance at the level of 5% \*\*\* Significance at the level of 10%



**Figure 2: The Scale of the Degree of Exchange Rate Pass Through in Different Deciles**

The attained results from the Fitting of Quantile regression show that the degree of exchange rate pass through in every estimated decile is the exchange rate coefficient and it indicates the elasticity of the import price to the exchange rate. Based on the results of this study, the higher the exchange rate is, the lower the degree of exchange rate pass through is. Therefore, with rising of exchange rates, production costs increases, and this will increase the price of manufactured goods leading to rise of inflation. Also, according to Asgharpour and et al (2015), the degree of exchange rate pass through on the imports' price decreases as well. Therefore, the findings of this study are compatible with the findings of Asgharpour and et al., (2015). As the results show, the degree of exchange rate pass through has been in fluctuating between 0.04-0.21. However, in terms of statistics, the degree of exchange rate pass through is meaningful up to middle and after that it is not meaningful. Therefore, the range of changes of degree of exchange rate pass through is between 0.08-0.21 and this condition indicates incomplete degree of exchange rate pass through in Iran's economy.

## Conclusion

In this research, the degree of exchange rate pass through has been estimated using Quantile regression for the Iranian economy during the period 1991-2014: 4. The results show

<sup>1</sup>As the sign of LnPPI was against the theory, and also it was not significant statistically, it has deleted from the model.

that the degree of exchange rate pass through in each of the estimated the deciles is the same as the exchange rate coefficient and it indicates elasticity of imports' price in exchange rate. Also, the degree of exchange rate pass through has been fluctuating between -0.04-0.21. However, in terms of statistics, the degree of exchange rate pass through is meaningful up to middle and after that it is not meaningful. Therefore, the range of changes of degree of exchange rate pass through is between 0.08-0.21 and this indicates the incomplete degree of exchange rate pass through in Iran's economy. Therefore, it can be understood that at the lower levels of the exchange rate the degree of exchange rate pass through is higher. Also with the growth of exchange rate, the degree of exchange rate pass through has declined and this indicates that with the increase in the exchange rate, the growth of the cost of production caused by the increase in exchange rates will be transferred less into the imports' price by the importers. In fact, they have decreased the margin of their profit. In other words, at lower exchange rates, importers react more strongly to increasing of costs of exchange rate and have increased the imports costs. But at higher exchange rates, importers' reaction to lower exchange rates is lower, which means a reduction of the margins of profit of importers.

Therefore, recommendations of this research in terms of policy making are:

1. If the goal is to control the price of imports so that technology transfer can be achieved to facilitate the economic growth, governments should consider the degree of exchange rate pass through on imports' price while making their foreign exchange policies. In such a way that, in lower levels, the government should be careful about the growth of exchange rates by adopting controlling policies. But in the higher exchange rates, concerns about the increase of exchange rates decrease.
2. Based on the coefficients of gross domestic product, government to control the imports' price should consider the size of gross domestic production. As the import price increases further with the increase of gross domestic production, the government must reimburse the effects of increasing of domestic gross production of country on imports' prices in a different way. Considering the results of the research, indicating an inverse relationship between gross domestic production and its impact factor on imports' price, it can be suggested that government should increase the economic growth to reduce the impacts of increase of domestic gross production in order to limit the impacts of growth of domestic gross production on imports' price.
3. Considering the coefficients of the degree of openness of economy in different deciles, it is imperative that government consider the intensity of the degree of openness of the economy in imports' price control policies. Considering the different impacts of the

degree of the openness of economy on economic growth and other macro-variables, it is necessary that government adjust its policies according to the manner of effectiveness of degree of openness of economy.

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